Mechanism of Neural Signal Amplification May Be Artificially Duplicated to Achieve Coherent Signal Amplification in Support of Useful Capture of Single-Photon Signals at Room Temperature in Support of SPIN/OPT Solid-State Polarity Control/Binning Camera Systems (pub: 20210822)

6 October 2022
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Introduction

We take for granted the ability to "step up" the amperage of an electrical pulse when a stronger signal is desired. When the signal one starts out with amounts to at least a millionth of an ampere, existing systems can divert a small portion of those electrons to throw a switch. When thrown, a signal is sent to dump additional electrons into the stream, rather like adding additional elephants to a herd of elephants hopefully somewhere near the middle of the "pack".

When the thing being detected is a single photon, however, stepping up voltage becomes problematic. It is critical that the added energy not corrupt, in this case, a photon's property of frequency (critical for interpreting color data) and that parallel amplification systems amplify with absolute uniformity (critical for assessing luminance value.)

While the ability to achieve this amplifying step at near-absolute zero has been demonstrated for many years, the ability to bin single photons has its origins only one year in the past. To make this into a working camera system, we must add to this binning system conceived of on August 22, 2021 a system for amplification of individual photons.

Taking inspiration from my own model of the Primary Motor Cortex's amplification process, I propose duplicating that process artificially to perform at room temperature what a Josephson Junction accomplishes near absolute zero.

In the human brain, signal amplification is achieved by enabling the free circulation of lithium ions capable of freely migrating in and out of myelin (this constant cycling of the lithium atoms in myelin is essential to prevent clumping, which can lead to reduced free serum lithium and Bipolar and associated disorders.) The embedding of many individual lithium ions amongst the lipid cells making up the myelin coating conditionally forms a circuit that is capable of permitting the flow of energy from electrical reserves (these could be capacitors in a synthetic version) in neurons.

This process is so efficient that a single electron can accumulate more electrons like a snowball rolling down a hill. While myelin is ordinarily insulative and certainly does enhance conduction, it is important for the scientific community to understand that a large part of the mechanism behind this enhanced conductivity lies in a seamless signal amplification that maintains and in the case of the PMC, strengthens transmissions.

A similar, bio-mimetic system would be essential for the functioning of an optics platform designed to capture individual photons. Perhaps the greatest engineering challenge in a synthetic emulation of signal amplification as it transpires in the brain is in re-ionization of the lithium atoms after each amplification cycle, where cycles would need to be restarted at high frequency. The brain's means of dealing with this issue is in having a constant flow of freshly ionized lithium atoms that migrate into the myelin and physically replace the electrified lithiums which must migrate to re-ionization cells where they can be reset (similar to the neutralization chamber in an ionic propulsion system except reversed.)

In an artificial system, the lithium component must be static and able to be re-ionized in-situ. While lithium certainly has the potential to be more strongly positive than ionic hydrogen, it has a tendency to retain electrical charge any time it is used as a conduit for flowing electricity.

Considering this and also considering the properties of the lipids, which play a role in completing the organic circuits that facilitate amplifying mechanisms in the brain, a hydrogen ion-based approach would seem most sensible.

As published in my hypothesis concerning the cause of rapid heating of lipids in microwave ovens, the interweaved protein configuration of lipids, I would suggest, cause electrons in lipids to be coaxed into areas near the intersection of the weaves. In these zones, the electrons are slowed by the magnetic fields of the valence electrons of those proteins making up the lipid. An indirect consequence of this is that orbiting electrons spend less of their time on the sides of the non-overlapping lengths of the "basket weaves" and this means that lipids can be conditionally electrically conductive in the transverse direction (the one normally thought to be purely insulative in the case of myelin.) This effect combined with the embedded lithium ions is likely responsible for organic neural signal amplification.

Within a synthetic myelin structure, if we embed hydrogen ions and we lock these ions in place between two atomically thick lipid layers and then only at the non-overlapping parts of that weave in the lipids (putting them in a defacto intermittently ionized zones) we can preserve them as ions, assuring they only hold a charge for the briefest of moments.

On the other side of this lipid bi-layer would be a nanoscopically thin capacitor that has many forks but is ultimately one contiguous piece that eventually connects to a power source. A separate fork runs in parallel with the each lipid bi-layer and associated photonic aperture/corridor.

Conclusion

While such a system would push the limits of our ability to synthesize complex structures, it is likely the simplest means of making the technology in question a reality.

Note: The need to amplify individual photons may be, ultimately, unnecessary as this author proposed systems for the measurement of subsamples of three photons from the same wave as well as systems which allow for the indirect

measurement of single photons through the magnetic amplification of those photons when coupled with a spinless control photon as in 11 April 2024.